CHEMISTS SERVE PRODUCERS OF HAY

A radio talk by Dr. Henry G. Knight, Chief, Bureau of Chemistry and Soils, delivered in the Department of Agriculture period of the National Farm and Home Hour Wednesday, November 23, 1932, by a network of 48 associate NBC radio stations.

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SALISBURY:

It has been two weeks since we have listened to one of Dr. Henry G. Knight's interesting and practical reports on recent results of scientific investigations by the Department of Agriculture chemists. As you know, Dr. Knight is chief of the Bureau of Chemistry and Soils. I know we're all glad to welcome him back to the microphone again to give us another report. This time it's on the results of investigations by chemical engineers into the reasons why hay heats or burns during curing or storage. All right, Dr. Knight.

KNIGHT:

Thank you, Salisbury.

I hope you Farm and Home Hour listeners will endorse Salisbury's welcome to me. My talk today really is going to be dry. We've found out that the main reason why hay heats and burns in storage is that it contains too much moisture.

But that's jumping right into the middle of the story of research on spontaneous heating of hay. The story of research on spontaneous ignition of hay begins back in 1925 when organizations interested in prevention of farm fires requested the Department of Agriculture to investigate the causes of various types of such fires, including hay fires.

Now this really was and is a subject worth investigating. I wonder if you realize that heating of hay causes an annual loss of more than 60 million dollars. Twenty million of the loss comes from complete destruction of hay or buildings through fires caused by spontaneous ignition. More than 40 million of the loss is due to spoilage of the hay even though it does not heat to the point where it burns up.

Every farmer knows that hay has the highest nutritive value for farm animals when it is preserved as closely to the natural state of the grass as possible. Now the more heating the hay undergoes while it is curing or in storage, the further away it gets from the natural state of the grass. The nutrition chemists analyzing heated hay have found that it contains far less carbohydrates and nitrogenous compounds than the grass from which it is made. With these nutrients lost by heating, the hay becomes merely roughage. And that is the type of damage that amounts to 40 million dollars a year in this country.

You can see that this type of loss is even more serious than the loss from actual fires. We have an authoritative estimate that for every 25 actual fires resulting from spontaneous combustion, there are not less than 167 cases of carbonization of the hay -- reduction in feed value -- resulting from overheating.

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Well, of course, farmers have known for a long time that they lost every time hay heated too much while it was curing or in storage. They have used many methods of curing to stop this loss. I won't go into these methods here. Our research has simply added more proof to a huge volume of practical experience indicating the value of allowing hay to cure in the cock before storage in order to reduce the hazard of fire or heating. Our research has confirmed the fact that too much moisture in the hay when it goes into storage is the basic cause of fires and heating.

Well, you want to know what results we have got from the investigations. I'll give you a report right now. We have been running two sorts of studies on this problem. One has been a study of records of fires due to spontaneous ignition of hay. The other has been experiments on hay in storage to find out the effects of moisture content, amount of hay stored, and methods of curing, storing, and ventilating on spontaneous heating and ignition of hay.

Now first I'll give you a brief summary of the records of fires due to spontaneous ignition. We got complete records on 18 fires in 1931. Nine-tenths of the fires occurred in June, July, August, or September. The most interesting figures in the records were the figures on the number of days from the time the hay was put into the storage to the time the fire broke out. The average number of days was 43. One fire broke out two days after the hay was stored, and another waited 330 days.

It seemed significant that either clover or alfalfa, whether alone or in combination with other hays, was involved in the majority of the fires on which records were reported to us.

Therefore, I'm going to give you the results of our experiments on the methods of avoiding losses from spontaneous ignition of stored alfalfa.

We've had some very interesting experiences with the hay that we have stored in a barn at the Department of Agriculture farm at Beltsville, Maryland. By putting hay of various moisture content in the mow we have produced a finished product ranging all the way from good quality hay to black, spoiled hay. In one of these experiments the hay became quite hot. We recorded a temperature of 192 degrees Fahrenheit at one spot in the mow. In diagnosing this case, we feel that all the patient needed to send the temperature still higher was more air. The temperature would have climbed and eventually that mow full of hay would have caught fire if the right amount of air from the outside had gradually reached that hot spot. Hay takes fire and burns with a flame at about 450 degrees Fahrenheit.

I would not have you feel that we have by any means solved the problem of storing alfalfa so that it will not heat or burn. But we have learned the following facts concerning precautions that will help to prevent alfalfa from heating in storage:

First, if you keep the moisture content of loose hay in the barn below 30 per cent it will be pretty safe from heating or burning. Now, of course, you can't look at hay or apply any ordinary test that doesn't require some scientific apparatus and find out its moisture content. Before you can use this fact that we have found, you must be provided with a practical means of testing the moisture

content of Hay so you can tell whether it is above or below 30 per cent. We are trying to devise such a method now.

The second fact we have established is that mows containing 10 tons of hay or less are not apt to heat dangerously.

Third, we have found that we can keep down the growth of bacteria and delay the development of mold by adding salt to hay placed in storage. By delaying the development of bacteria and mold, we have been successful in curing the hay. But let me emphasize this point: You can't make up for poor curing of the hay in the field by adding salt in the mow.

Our fourth finding is that if hay is too wet or too green or too densely packed, it will not ignite spontaneously. However, it will ferment and mold so badly that it will not be fit for feeding purposes.

And there are the findings of our research on spontaneous ignition of hay. A good many of the State agricultural extension services have further information on these findings. Let me suggest that you consult your county agent for this information.

Now, on behalf of the Department of Agriculture, I send you greetings at this Thanksgiving season before I say goodbye until November 25.